SEQUENCE LISTING

<110> INSTITUT PASTEUR
INSTITUT PASTEUR DE TUNIS

<120> GENE ASSOCIATED WITH LEISHMANIA PARASITE VIRULENCE

<130> B4866AI -AD/VMA

<140>
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<150> FR 0107985

<151> 2001-06-18

<150> PCT/FR02/02086
<151> 2002-06-17

<160> 10

<170> PatentIn Ver. 2.1

<210> 1
<211> 2094
<212> DNA
<213> Leishmania major

<220>
<221> CDS
<222> (241)..(1674)
<223> LmPDI coding sequence (orf)

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agtgctcagc tctaccctat ttgtattgat accgttttcc ttttcgtttt gcaaagaaaa 240

atg cag cgc tca ttc ctt gtt ttt gtt ctg tgc gcc ctt ctc ttc tgc 288
Met Gln Arg Ser Phe Leu Val Phe Val Leu Cys Ala Leu Leu Phe Cys
1 5 10 15

gtc gcg tcc gca gag gtg cag gtg gcc act aag gac aac ttt gac aag 336

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Val Ala Ser Ala Glu Val Gln Val Ala Thr Lys Asp Asn Phe Asp Lys
            20                  25                  30

gtc gta atc ggg gat ctc acg ttg gtc aag ttt tat gct ccg tgg tgc   384
Val Val Ile Gly Asp Leu Thr Leu Val Lys Phe Tyr Ala Pro Trp Cys
        35                  40                  45

ggc cac tgc aag aca ctc gcc ccg gag ttt gta aag gcc gct gac atg   432
Gly His Cys Lys Thr Leu Ala Pro Glu Phe Val Lys Ala Ala Asp Met
    50                  55                  60

ctg gcc ggc atc gcg acc ctt gca gag gtc gat tgc acc aaa gaa gag   480
Leu Ala Gly Ile Ala Thr Leu Ala Glu Val Asp Cys Thr Lys Glu Glu
65                  70                  75                  80

agc ctt gct gag aag tac gaa atc aag ggg ttc ccc acg ctg tac atc   528
Ser Leu Ala Glu Lys Tyr Glu Ile Lys Gly Phe Pro Thr Leu Tyr Ile
                85                  90                  95

ttc cgt aac ggt gag aaa gtg aag atc tac gat ggt ccc cgc act gcc   576
Phe Arg Asn Gly Glu Lys Val Lys Ile Tyr Asp Gly Pro Arg Thr Ala
            100                 105                 110

gcc ggc atc gcg tcg tac atg aag gcg cat gtc ggt cca tcg atg aag   624
Ala Gly Ile Ala Ser Tyr Met Lys Ala His Val Gly Pro Ser Met Lys
        115                 120                 125

gcc atc tca acg gct gaa gag ctg gag gag ctc aag aag gag act ttc   672
Ala Ile Ser Thr Ala Glu Glu Leu Glu Glu Leu Lys Lys Glu Thr Phe
    130                 135                 140

ccg gtg tgc gtg gtg aag aca gcg agc acc gac tcg gag atg gcg tcg   720
Pro Val Cys Val Val Lys Thr Ala Ser Thr Asp Ser Glu Met Ala Ser
145                 150                 155                 160

atg ata acc aag gtg gcg gac tct ctc cgc tcg cag atg aac ttt gtg   768
Met Ile Thr Lys Val Ala Asp Ser Leu Arg Ser Gln Met Asn Phe Val
                165                 170                 175

ctc gtg acg gat gcg gcc atc tct ccg aat gat gcc atg gag tcg gtt   816
Leu Val Thr Asp Ala Ala Ile Ser Pro Asn Asp Ala Met Glu Ser Val
            180                 185                 190

acg gtg tat cgc aag aat gcg gag cgc gag gcg tac acc ggc gct aca   864
Thr Val Tyr Arg Lys Asn Ala Glu Arg Glu Ala Tyr Thr Gly Ala Thr
        195                 200                 205
```

```
cca atg acg gca gag tcg gtg aag agc ttt ctc acg agt gct gtg ttg   912
Pro Met Thr Ala Glu Ser Val Lys Ser Phe Leu Thr Ser Ala Val Leu
    210                 215                 220

gac tac ttt ggc gag ctc ggc cag gag agc ttt cag aag tac atg gaa   960
Asp Tyr Phe Gly Glu Leu Gly Gln Glu Ser Phe Gln Lys Tyr Met Glu
225                 230                 235                 240

gcg aac aag gat aaa cct ctt ggg tgg gtg ttc atc gac aag aac acg   1008
Ala Asn Lys Asp Lys Pro Leu Gly Trp Val Phe Ile Asp Lys Asn Thr
                245                 250                 255

gat tct gcg ttg aag ggg tca ctt gtg gcg gtg gcg gag aag tac cgc   1056
Asp Ser Ala Leu Lys Gly Ser Leu Val Ala Val Ala Glu Lys Tyr Arg
            260                 265                 270

tcg cag gtg ttg cta acc tac att gac ggc gat cag tac cgc ccc gtc   1104
Ser Gln Val Leu Leu Thr Tyr Ile Asp Gly Asp Gln Tyr Arg Pro Val
        275                 280                 285

tcg cgc cag ctg ggc att cct gag gat gcg aag ttc ccg gcg ttt gtg   1152
Ser Arg Gln Leu Gly Ile Pro Glu Asp Ala Lys Phe Pro Ala Phe Val
    290                 295                 300

gtc gat ttc gag cgc cgc cat cac gtg atg ggg acg gac acc cca gtc   1200
Val Asp Phe Glu Arg Arg His His Val Met Gly Thr Asp Thr Pro Val
305                 310                 315                 320

acc tcc gag tct gtc gct gcg ttt gtg gag aag tat gtc aag ggc gag   1248
Thr Ser Glu Ser Val Ala Ala Phe Val Glu Lys Tyr Val Lys Gly Glu
                325                 330                 335

acg aag cag acc gtg atg tcc gac gcg att ccc gct aag gag acg gtg   1296
Thr Lys Gln Thr Val Met Ser Asp Ala Ile Pro Ala Lys Glu Thr Val
            340                 345                 350

aac ggc ctc aca acg gtg gtg ggt cag act ttt gcg aag tac acg gac   1344
Asn Gly Leu Thr Thr Val Val Gly Gln Thr Phe Ala Lys Tyr Thr Asp
        355                 360                 365

ggc aca caa aac gtg atg ctg ctc ttc tac gcg ccg tgg tgc gga cac   1392
Gly Thr Gln Asn Val Met Leu Leu Phe Tyr Ala Pro Trp Cys Gly His
    370                 375                 380

tgc aag aag ctg cac ccc gtc tac gat aaa gta gcc aag agc ttc gag   1440
Cys Lys Lys Leu His Pro Val Tyr Asp Lys Val Ala Lys Ser Phe Glu
385                 390                 395                 400
```

```
tct gag aat gtg atc att gcg aag atg gat gcc acg acg aac gac ttt   1488
Ser Glu Asn Val Ile Ile Ala Lys Met Asp Ala Thr Thr Asn Asp Phe
                405                 410                 415

gac cgc gag aag ttt gag gtg tct gga ttt cca acg att tac ttc atc   1536
Asp Arg Glu Lys Phe Glu Val Ser Gly Phe Pro Thr Ile Tyr Phe Ile
            420                 425                 430

cca gcc ggc aag ccg cca atc gtg tac gag ggt ggc cgc acc gca gac   1584
Pro Ala Gly Lys Pro Pro Ile Val Tyr Glu Gly Gly Arg Thr Ala Asp
        435                 440                 445

gaa atc cag gtg ttt gtg aag tct cac ctg acc gcc tcc gcc gct cca   1632
Glu Ile Gln Val Phe Val Lys Ser His Leu Thr Ala Ser Ala Ala Pro
    450                 455                 460

tct ggc ggc cct tcc ggc aac agc gaa gag gaa gat ttg tag           1674
Ser Gly Gly Pro Ser Gly Asn Ser Glu Glu Glu Asp Leu
465                 470                 475

gactgcaagg gatgtggcgt ttataggctg ccctgccttc ccttgctgtt tctatgacgg 1734

attaggcttt tttttgttat atgtggggtg gtcaagagag tgccagggct ccttctttat 1794

atccttgcgc tttcttttat tttgcttcct tgtgttgacg tctatgcatg cgtgctgtcg 1854

acgactcttt gtcaacctgc gtcctatcta gtagcatcga tgtgaaaaga agagtagagg 1914

gaggtaacga tgcgtgcgct ggctgccgtt ttcatgggcg caatttcgag aaggaaaatc 1974

ggaaaatgga caggatagcg aaattagcgc aacgacaagg tcgtgcgtct ttctctatcg 2034

gtcattaaat ttctgggctt tgtaacaatg aaagaagtca cacaaaaaaa aaaaaaaaaa 2094
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<210> 2
<211> 477
<212> PRT
<213> Leishmania major

<400> 2

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Met Gln Arg Ser Phe Leu Val Phe Val Leu Cys Ala Leu Leu Phe Cys
  1               5                  10                  15

Val Ala Ser Ala Glu Val Gln Val Ala Thr Lys Asp Asn Phe Asp Lys
            20                  25                  30
```

```
Val Val Ile Gly Asp Leu Thr Leu Val Lys Phe Tyr Ala Pro Trp Cys
         35                  40                  45

Gly His Cys Lys Thr Leu Ala Pro Glu Phe Val Lys Ala Ala Asp Met
     50                  55                  60

Leu Ala Gly Ile Ala Thr Leu Ala Glu Val Asp Cys Thr Lys Glu Glu
 65                  70                  75                  80

Ser Leu Ala Glu Lys Tyr Glu Ile Lys Gly Phe Pro Thr Leu Tyr Ile
                 85                  90                  95

Phe Arg Asn Gly Glu Lys Val Lys Ile Tyr Asp Gly Pro Arg Thr Ala
            100                 105                 110

Ala Gly Ile Ala Ser Tyr Met Lys Ala His Val Gly Pro Ser Met Lys
        115                 120                 125

Ala Ile Ser Thr Ala Glu Glu Leu Glu Glu Leu Lys Lys Glu Thr Phe
    130                 135                 140

Pro Val Cys Val Val Lys Thr Ala Ser Thr Asp Ser Glu Met Ala Ser
145                 150                 155                 160

Met Ile Thr Lys Val Ala Asp Ser Leu Arg Ser Gln Met Asn Phe Val
                165                 170                 175

Leu Val Thr Asp Ala Ala Ile Ser Pro Asn Asp Ala Met Glu Ser Val
            180                 185                 190

Thr Val Tyr Arg Lys Asn Ala Glu Arg Glu Ala Tyr Thr Gly Ala Thr
        195                 200                 205

Pro Met Thr Ala Glu Ser Val Lys Ser Phe Leu Thr Ser Ala Val Leu
    210                 215                 220

Asp Tyr Phe Gly Glu Leu Gly Gln Glu Ser Phe Gln Lys Tyr Met Glu
225                 230                 235                 240

Ala Asn Lys Asp Lys Pro Leu Gly Trp Val Phe Ile Asp Lys Asn Thr
                245                 250                 255

Asp Ser Ala Leu Lys Gly Ser Leu Val Ala Val Ala Glu Lys Tyr Arg
            260                 265                 270
```

```
Ser Gln Val Leu Leu Thr Tyr Ile Asp Gly Asp Gln Tyr Arg Pro Val
        275                 280                 285

Ser Arg Gln Leu Gly Ile Pro Glu Asp Ala Lys Phe Pro Ala Phe Val
    290                 295                 300

Val Asp Phe Glu Arg Arg His His Val Met Gly Thr Asp Thr Pro Val
305                 310                 315                 320

Thr Ser Glu Ser Val Ala Ala Phe Val Glu Lys Tyr Val Lys Gly Glu
                325                 330                 335

Thr Lys Gln Thr Val Met Ser Asp Ala Ile Pro Ala Lys Glu Thr Val
            340                 345                 350

Asn Gly Leu Thr Thr Val Val Gly Gln Thr Phe Ala Lys Tyr Thr Asp
        355                 360                 365

Gly Thr Gln Asn Val Met Leu Leu Phe Tyr Ala Pro Trp Cys Gly His
    370                 375                 380

Cys Lys Lys Leu His Pro Val Tyr Asp Lys Val Ala Lys Ser Phe Glu
385                 390                 395                 400

Ser Glu Asn Val Ile Ile Ala Lys Met Asp Ala Thr Thr Asn Asp Phe
                405                 410                 415

Asp Arg Glu Lys Phe Glu Val Ser Gly Phe Pro Thr Ile Tyr Phe Ile
            420                 425                 430

Pro Ala Gly Lys Pro Pro Ile Val Tyr Glu Gly Gly Arg Thr Ala Asp
        435                 440                 445

Glu Ile Gln Val Phe Val Lys Ser His Leu Thr Ala Ser Ala Ala Pro
    450                 455                 460

Ser Gly Gly Pro Ser Gly Asn Ser Glu Glu Glu Asp Leu
465                 470                 475
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<210> 3
<211> 467
<212> PRT
<213> Artificial sequence

<220>

<223> Description of artificial sequence: recombinant protein

<400> 3

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Met Ala Glu Val Gln Val Ala Thr Lys Asp Asn Phe Asp Lys Val Val
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Ile Gly Asp Leu Thr Leu Val Lys Phe Tyr Ala Pro Trp Cys Gly His
             20                  25                  30

Cys Lys Thr Leu Ala Pro Glu Phe Val Lys Ala Ala Asp Met Leu Ala
         35                  40                  45

Gly Ile Ala Thr Leu Ala Glu Val Asp Cys Thr Lys Glu Glu Ser Leu
     50                  55                  60

Ala Glu Lys Tyr Glu Ile Lys Gly Phe Pro Thr Leu Tyr Ile Phe Arg
 65                  70                  75                  80

Asn Gly Glu Lys Val Lys Ile Tyr Asp Gly Pro Arg Thr Ala Ala Gly
                 85                  90                  95

Ile Ala Ser Tyr Met Lys Ala His Val Gly Pro Ser Met Lys Ala Ile
            100                 105                 110

Ser Thr Ala Glu Glu Leu Glu Glu Leu Lys Lys Glu Thr Phe Pro Val
        115                 120                 125

Cys Val Val Lys Thr Ala Ser Thr Asp Ser Glu Met Ala Ser Met Ile
    130                 135                 140

Thr Lys Val Ala Asp Ser Leu Arg Ser Gln Met Asn Phe Val Leu Val
145                 150                 155                 160

Thr Asp Ala Ala Ile Ser Pro Asn Asp Ala Met Glu Ser Val Thr Val
                165                 170                 175

Tyr Arg Lys Asn Ala Glu Arg Glu Ala Tyr Thr Gly Ala Thr Pro Met
            180                 185                 190

Thr Ala Glu Ser Val Lys Ser Phe Leu Thr Ser Ala Val Leu Asp Tyr
        195                 200                 205

Phe Gly Glu Leu Gly Gln Glu Ser Phe Gln Lys Tyr Met Glu Ala Asn
    210                 215                 220

Lys Asp Lys Pro Leu Gly Trp Val Phe Ile Asp Lys Asn Thr Asp Ser
225                 230                 235                 240
```

Ala Leu Lys Gly Ser Leu Val Ala Val Ala Glu Lys Tyr Arg Ser Gln
245 250 255

Val Leu Leu Thr Tyr Ile Asp Gly Asp Gln Tyr Arg Pro Val Ser Arg
260 265 270

Gln Leu Gly Ile Pro Glu Asp Ala Lys Phe Pro Ala Phe Val Val Asp
275 280 285

Phe Glu Arg Arg His His Val Met Gly Thr Asp Thr Pro Val Thr Ser
290 295 300

Glu Ser Val Ala Ala Phe Val Glu Lys Tyr Val Lys Gly Glu Thr Lys
305 310 315 320

Gln Thr Val Met Ser Asp Ala Ile Pro Ala Lys Glu Thr Val Asn Gly
325 330 335

Leu Thr Thr Val Val Gly Gln Thr Phe Ala Lys Tyr Thr Asp Gly Thr
340 345 350

Gln Asn Val Met Leu Leu Phe Tyr Ala Pro Trp Cys Gly His Cys Lys
355 360 365

Lys Leu His Pro Val Tyr Asp Lys Val Ala Lys Ser Phe Glu Ser Glu
370 375 380

Asn Val Ile Ile Ala Lys Met Asp Ala Thr Thr Asn Asp Phe Asp Arg
385 390 395 400

Glu Lys Phe Glu Val Ser Gly Phe Pro Thr Ile Tyr Phe Ile Pro Ala
405 410 415

Gly Lys Pro Pro Ile Val Tyr Glu Gly Gly Arg Thr Ala Asp Glu Ile
420 425 430

Gln Val Phe Val Lys Ser His Leu Thr Ala Ser Ala Ala Pro Ser Gly
435 440 445

Gly Pro Ser Gly Asn Ser Glu Glu Glu Asp Leu Leu Glu His His His
450 455 460

His His His
465

<210> 4
<211> 497
<212> PRT
<213> T. brucei

<400> 4

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Met Arg Ala Ile Phe Leu Val Ala Leu Ala Leu Ala Thr Met Arg Glu
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Ser Thr Ala Glu Ser Leu Lys Leu Thr Lys Glu Asn Phe Asn Glu Thr
             20                  25                  30

Ile Ala Lys Ser Glu Ile Phe Leu Val Lys Phe Tyr Val Asp Thr Cys
         35                  40                  45

Gly Tyr Cys Gln Met Leu Ala Pro Glu Trp Glu Lys Ala Ala Asn Glu
     50                  55                  60

Thr Ile Asp Asn Ala Leu Met Gly Glu Val Asp Cys His Ser Gln Pro
 65                  70                  75                  80

Glu Leu Ala Ala Asn Phe Ser Ile Arg Gly Tyr Pro Thr Ile Ile Leu
                 85                  90                  95

Phe Arg Asn Gly Lys Glu Ala Glu His Tyr Gly Gly Ala Arg Thr Lys
            100                 105                 110

Asp Asp Ile Ile Lys Tyr Ile Lys Ala Asn Val Gly Pro Ala Val Thr
        115                 120                 125

Pro Ala Ser Asn Ala Glu Glu Val Thr Arg Ala Lys Glu Glu His Asp
    130                 135                 140

Val Val Cys Val Gly Leu Thr Ala Asn Asn Ser Thr Ser Leu Ser Thr
145                 150                 155                 160

Thr Leu Ala Glu Ala Ala Gln Ser Phe Arg Val Ser Leu Lys Phe Phe
                165                 170                 175

Glu Ala Glu Pro Lys Leu Phe Pro Asp Glu Lys Pro Glu Thr Ile Val
            180                 185                 190

Val Tyr Arg Lys Gly Gly Glu Lys Glu Val Tyr Asp Gly Pro Met Glu
        195                 200                 205

Val Glu Lys Leu Thr Glu Phe Leu Gln Ile Ser Arg Val Ala Phe Gly
```

```
    210                 215                 220

Gly Glu Ile Thr Pro Glu Asn Tyr Gln Tyr Tyr Ser Val Ile Lys Arg
225                 230                 235                 240

Pro Val Gly Trp Ala Met Val Lys Pro Asn Glu Thr Ala Ser Ile Glu
                245                 250                 255

Leu Lys Glu Ser Leu Thr Glu Val Gly Lys Lys Met Arg Ser His Met
            260                 265                 270

Val Val Leu Trp Val Asn Ile Ser Lys His Pro Val Trp Arg Asp Phe
        275                 280                 285

Gly Val Pro Glu Asp Ala Lys Tyr Pro Ala Phe Leu Ala Ile His Trp
    290                 295                 300

Gly Ala Asn Tyr Leu His Ser Thr Ala Glu Val Val Thr Arg Glu Ser
305                 310                 315                 320

Leu Glu Lys Phe Ile Leu Glu Phe Ala Ala Gly Arg Val Glu Pro Thr
                325                 330                 335

Ile Lys Ser Leu Pro Val Pro Glu Val Glu Thr Val Asp Gly Lys Thr
            340                 345                 350

Thr Ile Val Ala Lys Thr Met Gln Lys His Leu Thr Ser Gly Lys Asp
        355                 360                 365

Met Leu Ile Leu Phe Phe Ala Pro Trp Cys Gly His Cys Lys Asn Phe
    370                 375                 380

Ala Pro Thr Phe Asp Lys Ile Ala Lys Glu Phe Asp Ala Thr Asp Leu
385                 390                 395                 400

Ile Val Ala Glu Leu Asp Ala Thr Ala Asn Tyr Val Asn Ser Ser Thr
                405                 410                 415

Phe Thr Val Thr Ala Phe Pro Thr Val Phe Phe Val Pro Asn Gly Gly
            420                 425                 430

Lys Pro Val Val Phe Glu Gly Glu Arg Ser Phe Glu Asn Val Tyr Glu
        435                 440                 445

Phe Val Arg Lys His Val Thr Thr Phe Lys Val Ser Glu Lys Pro Ala
    450                 455                 460
```

```
Asn Val Thr Glu Glu Lys Lys Ser Glu Glu Glu Asn Lys Ser Ser Lys
465                 470                 475                 480

Ser Asn Glu Ser Asn Asp Ser Asn Glu Ser Asn Val Asp Lys Gln Asp
                485                 490                 495

Leu
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<211> 502
<212> PRT
<213> H. jecorina

<400> 5

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Met Gln Gln Lys Arg Leu Thr Ala Ala Leu Val Ala Ala Leu Ala Ala
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Val Val Ser Ala Glu Ser Asp Val Lys Ser Leu Thr Lys Asp Thr Phe
             20                  25                  30

Asn Asp Phe Ile Asn Ser Asn Asp Leu Val Leu Ala Glu Ser Phe Ala
         35                  40                  45

Pro Trp Cys Gly His Cys Lys Ala Leu Ala Pro Glu Tyr Glu Glu Ala
     50                  55                  60

Ala Thr Thr Leu Lys Asp Lys Ser Ile Lys Leu Ala Lys Val Asp Cys
 65                  70                  75                  80

Val Glu Glu Ala Asp Leu Cys Lys Glu His Gly Val Glu Gly Tyr Pro
                85                  90                  95

Thr Leu Lys Val Phe Arg Gly Leu Asp Lys Val Ala Pro Tyr Thr Gly
            100                 105                 110

Pro Arg Lys Ala Asp Gly Ile Thr Ser Tyr Met Val Lys Gln Ser Leu
        115                 120                 125

Pro Ala Val Ser Ala Leu Thr Lys Asp Thr Leu Glu Asp Phe Lys Thr
    130                 135                 140

Ala Asp Lys Val Val Leu Val Ala Tyr Ile Ala Ala Asp Asp Lys Ala
145                 150                 155                 160
```

Ser Asn Glu Thr Phe Thr Ala Leu Ala Asn Glu Leu Arg Asp Thr Tyr
165 170 175

Leu Phe Gly Gly Val Asn Asp Ala Ala Val Ala Glu Ala Glu Gly Val
180 185 190

Lys Phe Pro Ser Ile Val Leu Tyr Lys Ser Phe Asp Glu Gly Lys Asn
195 200 205

Val Phe Ser Glu Lys Phe Asp Ala Glu Ala Ile Arg Asn Phe Ala Gln
210 215 220

Val Ala Ala Thr Pro Leu Val Gly Glu Val Gly Pro Glu Thr Tyr Ala
225 230 235 240

Gly Tyr Met Ser Ala Gly Ile Pro Leu Ala Tyr Ile Phe Ala Glu Thr
245 250 255

Ala Glu Glu Arg Glu Asn Leu Ala Lys Thr Leu Lys Pro Val Ala Glu
260 265 270

Lys Tyr Lys Gly Lys Ile Asn Phe Ala Thr Ile Asp Ala Lys Asn Phe
275 280 285

Gly Ser His Ala Gly Asn Ile Asn Leu Lys Thr Asp Lys Phe Pro Ala
290 295 300

Phe Ala Ile His Asp Ile Glu Lys Asn Leu Lys Phe Pro Phe Asp Gln
305 310 315 320

Ser Lys Glu Ile Thr Glu Lys Asp Ile Ala Ala Phe Val Asp Gly Phe
325 330 335

Ser Ser Gly Lys Ile Glu Ala Ser Ile Lys Ser Glu Pro Ile Pro Glu
340 345 350

Thr Gln Glu Gly Pro Val Thr Val Val Val Ala His Ser Tyr Lys Asp
355 360 365

Ile Val Leu Asp Asp Lys Lys Asp Val Leu Ile Glu Phe Tyr Thr Pro
370 375 380

Trp Cys Gly His Cys Lys Ala Leu Ala Pro Lys Tyr Asp Glu Leu Ala
385 390 395 400

Ser Leu Tyr Ala Lys Ser Asp Phe Lys Asp Lys Val Val Ile Ala Lys
405 410 415

```
Val Asp Ala Thr Ala Asn Asp Val Pro Asp Glu Ile Gln Gly Phe Pro
            420                 425                 430

Thr Ile Lys Leu Tyr Pro Ala Gly Asp Lys Lys Asn Pro Val Thr Tyr
        435                 440                 445

Ser Gly Ala Arg Thr Val Glu Asp Phe Ile Glu Phe Ile Lys Glu Asn
    450                 455                 460

Gly Lys Tyr Lys Ala Gly Val Glu Ile Pro Ala Glu Pro Thr Glu Glu
465                 470                 475                 480

Ala Glu Ala Ser Glu Ser Lys Ala Ser Glu Glu Ala Lys Ala Ser Glu
                485                 490                 495

Glu Thr His Asp Glu Leu
            500
```

<210> 6
<211> 488
<212> PRT
<213> C. elegans

<400> 6

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Met Ile Trp Val Gln Ala Ala Leu Val Ala Ser Phe Leu Ala Phe Ala
  1               5                  10                  15

Ser Ala Gly Gly Ala Val Leu Glu Tyr Thr Asp Gly Asn Phe Asp Asp
             20                  25                  30

Leu Ile Gln Thr His Asp Ile Ala Leu Val Lys Phe Tyr Ala Pro Trp
         35                  40                  45

Cys Gly His Cys Lys Lys Ile Ala Pro Glu Tyr Glu Arg Ala Ala Pro
     50                  55                  60

Lys Leu Ala Ser Asn Asp Pro Pro Val Ala Leu Val Lys Val Asp Cys
 65                  70                  75                  80

Thr Thr Glu Lys Thr Val Cys Asp Lys Phe Gly Val Lys Gly Phe Pro
                 85                  90                  95

Thr Leu Lys Ile Phe Arg Asn Gly Val Pro Ala Gln Asp Tyr Asp Gly
            100                 105                 110
```

```
Pro Arg Asp Ala Asp Gly Ile Val Lys Phe Met Arg Gly Gln Ser Gly
        115                 120                 125

Pro Ser Ser Lys Glu Leu Lys Thr Val Ala Glu Phe Glu Lys Phe Thr

    130                 135                 140

Gly Gly Asp Glu Asn Val Val Ile Gly Phe Phe Glu Ser Glu Ser Lys
145                 150                 155                 160

Leu Lys Asp Ser Tyr Leu Lys Val Ala Asp Thr Glu Arg Asp Arg Phe
                165                 170                 175

Ser Phe Ala His Thr Ser Asn Lys Asp Ile Ile Lys Lys Ala Gly Tyr
            180                 185                 190

Ser Asp Asp Val Val Val Phe Val Pro Lys Lys Leu His Asn Lys Phe
        195                 200                 205

Asp Thr Asn Glu Phe Lys Tyr Asp Gly Asn Tyr Asp Thr Asp Lys Ile
    210                 215                 220

Lys Asn Phe Leu Val His Glu Thr Val Gly Phe Ala Gly Ile Arg Thr
225                 230                 235                 240

Gln Gly Asn Leu Phe Gln Phe Glu Gln Lys Pro Ile Val Ile Val Tyr
                245                 250                 255

Tyr Asn Val Asp Tyr Val Lys Asp Pro Lys Gly Ser Asn Tyr Trp Arg
            260                 265                 270

Asn Arg Val Leu Lys Val Ala Gln Asn Tyr Lys Arg Lys Val Gln Phe
        275                 280                 285

Ala Val Ser Asn Lys Glu Glu Phe Ser Ser Glu Ile Glu Thr Asn Gly
    290                 295                 300

Leu Gly Glu Arg Lys Asp Ser Asp Lys Pro Ile Val Ala Ile Leu Thr
305                 310                 315                 320

Asn Glu Gly Lys Tyr Pro Met Asp Gln Glu Phe Ser Val Asp Asn Leu
                325                 330                 335

Gln Gln Phe Val Asp Glu Val Leu Ala Gly Asn Ala Glu Pro Tyr Met
            340                 345                 350
```

```
Lys Ser Glu Pro Ile Pro Asp Glu Gln Gly Asp Val Lys Val Ala Val
        355                 360                 365

Gly Lys Asn Phe Lys Glu Leu Ile Met Asp Ala Asp Lys Asp Val Leu
    370                 375                 380

Ile Glu Phe Tyr Ala Pro Trp Cys Gly His Cys Lys Ser Leu Ala Pro
385                 390                 395                 400

Lys Tyr Glu Glu Leu Ala Glu Lys Leu Asn Lys Glu Asp Val Ile Ile
                405                 410                 415

Ala Lys Met Asp Ala Thr Ala Asn Asp Val Pro Pro Met Phe Glu Val
            420                 425                 430

Arg Gly Phe Pro Thr Leu Phe Trp Leu Pro Lys Asn Ala Lys Ser Asn
        435                 440                 445

Pro Ile Pro Tyr Asn Gly Gly Arg Glu Val Lys Asp Phe Val Ser Phe
    450                 455                 460

Ile Ser Lys His Ser Thr Asp Gly Leu Lys Gly Phe Ser Arg Asp Gly
465                 470                 475                 480

Lys Lys Lys Lys Lys Thr Glu Leu
                485
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<210> 7
<211> 532
<212> PRT
<213> C. reinhard

<400> 7

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Met Asn Arg Trp Asn Leu Leu Ala Leu Thr Leu Gly Leu Leu Leu Val
  1               5                  10                  15

Ala Ala Pro Phe Thr Lys His Gln Phe Ala His Ala Ser Asp Glu Tyr
            20                  25                  30

Glu Asp Asp Glu Glu Asp Asp Ala Pro Ala Ala Pro Lys Asp Asp Asp
        35                  40                  45

Val Asp Val Thr Val Val Thr Val Lys Asn Trp Asp Glu Thr Val Lys
    50                  55                  60
```

```
Lys Ser Lys Phe Ala Leu Val Glu Phe Tyr Ala Pro Trp Cys Gly His
 65                  70                  75                  80

Cys Lys Thr Leu Lys Pro Glu Tyr Ala Lys Ala Ala Thr Ala Leu Lys
                85                  90                  95

Ala Ala Ala Pro Asp Ala Leu Ile Ala Lys Val Asp Ala Thr Gln Glu
            100                 105                 110

Glu Ser Leu Ala Gln Lys Phe Gly Val Gln Gly Tyr Pro Thr Leu Lys
        115                 120                 125

Trp Phe Val Asp Gly Glu Leu Ala Ser Asp Tyr Asn Gly Pro Arg Asp
    130                 135                 140

Ala Asp Gly Ile Val Gly Trp Val Lys Lys Lys Thr Gly Pro Pro Ala
145                 150                 155                 160

Val Thr Val Glu Asp Ala Asp Lys Leu Lys Ser Leu Glu Ala Asp Ala
                165                 170                 175

Glu Val Val Val Val Gly Tyr Phe Lys Ala Leu Glu Gly Glu Ile Tyr
            180                 185                 190

Asp Thr Phe Lys Ser Tyr Ala Ala Lys Thr Glu Asp Val Val Phe Val
        195                 200                 205

Gln Thr Thr Ser Ala Asp Val Ala Lys Ala Ala Gly Leu Asp Ala Val
    210                 215                 220

Asp Thr Val Ser Val Val Lys Asn Phe Ala Gly Glu Asp Arg Ala Thr
225                 230                 235                 240

Ala Val Leu Ala Thr Asp Ile Asp Thr Asp Ser Leu Thr Ala Phe Val
                245                 250                 255

Lys Ser Glu Lys Met Pro Pro Thr Ile Glu Phe Asn Gln Lys Asn Ser
            260                 265                 270

Asp Lys Ile Phe Asn Ser Gly Ile Asn Lys Gln Leu Ile Leu Trp Thr
        275                 280                 285

Thr Ala Asp Asp Leu Lys Ala Asp Ala Glu Ile Met Thr Val Phe Arg
    290                 295                 300

Glu Ala Ser Lys Lys Phe Lys Gly Gln Leu Val Phe Val Thr Val Asn
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305 310 315 320

Asn Glu Gly Asp Gly Ala Asp Pro Val Thr Asn Phe Phe Gly Leu Lys
325 330 335

Gly Ala Thr Ser Pro Val Leu Leu Gly Phe Phe Met Glu Lys Asn Lys
340 345 350

Lys Phe Arg Met Glu Gly Glu Phe Thr Ala Asp Asn Val Ala Lys Phe
355 360 365

Ala Glu Ser Val Val Asp Gly Thr Ala Gln Ala Val Leu Lys Ser Glu
370 375 380

Ala Ile Pro Glu Asp Pro Tyr Glu Asp Gly Val Tyr Lys Ile Val Gly
385 390 395 400

Lys Thr Val Glu Ser Val Val Leu Asp Glu Thr Lys Asp Val Leu Leu
405 410 415

Glu Val Tyr Ala Pro Trp Cys Gly His Cys Lys Lys Leu Glu Pro Ile
420 425 430

Tyr Lys Lys Leu Ala Lys Arg Phe Lys Lys Val Asp Ser Val Ile Ile
435 440 445

Ala Lys Met Asp Gly Thr Glu Asn Glu His Pro Glu Ile Glu Val Lys
450 455 460

Gly Phe Pro Thr Ile Leu Phe Tyr Pro Ala Gly Ser Asp Arg Thr Pro
465 470 475 480

Ile Val Phe Glu Gly Gly Asp Arg Ser Leu Lys Ser Leu Thr Lys Phe
485 490 495

Ile Lys Thr Asn Ala Lys Ile Pro Tyr Glu Leu Pro Lys Lys Gly Ser
500 505 510

Asp Gly Asp Glu Gly Thr Ser Asp Asp Lys Asp Lys Pro Ala Ser Asp
515 520 525

Lys Asp Glu Leu
530

<210> 8

<211> 496
<212> PRT
<213> D. melano

<400> 8

```
Met Lys Phe Leu Ile Cys Ala Leu Phe Leu Ala Ala Ser Tyr Val Ala
  1               5                  10                  15

Ala Ser Ala Glu Ala Glu Val Lys Val Glu Glu Gly Val Leu Val Ala
             20                  25                  30

Thr Val Asp Asn Phe Lys Gln Leu Ile Ala Asp Asn Glu Phe Val Leu
         35                  40                  45

Val Glu Phe Tyr Ala Pro Trp Cys Gly His Cys Lys Ala Leu Ala Pro
     50                  55                  60

Glu Tyr Ala Lys Ala Ala Gln Gln Leu Ala Glu Lys Glu Ser Pro Ile
 65                  70                  75                  80

Lys Leu Ala Lys Val Asp Ala Thr Val Glu Gly Glu Leu Ala Glu Gln
                 85                  90                  95

Tyr Ala Val Arg Gly Tyr Pro Thr Leu Lys Phe Phe Arg Ser Gly Ser
            100                 105                 110

Pro Val Glu Tyr Ser Gly Gly Arg Gln Ala Ala Asp Ile Ile Ala Trp
        115                 120                 125

Val Thr Lys Lys Thr Gly Pro Pro Ala Lys Asp Leu Thr Ser Val Ala
    130                 135                 140

Asp Ala Glu Gln Phe Leu Lys Asp Asn Glu Ile Ala Ile Ile Gly Phe
145                 150                 155                 160

Phe Lys Asp Leu Glu Ser Glu Glu Ala Lys Thr Phe Thr Lys Val Ala
                165                 170                 175

Asn Ala Leu Asp Ser Phe Val Phe Gly Val Ser Ser Asn Ala Asp Val
            180                 185                 190

Ile Ala Lys Tyr Glu Ala Lys Asp Asn Gly Val Val Leu Phe Lys Pro
        195                 200                 205

Phe Asp Asp Lys Lys Ser Val Phe Glu Gly Glu Leu Asn Glu Glu Asn
    210                 215                 220
```

```
Leu Lys Lys Phe Ala Gln Val Gln Ser Leu Pro Leu Ile Val Asp Phe
225                 230                 235                 240

Asn His Glu Ser Ala Ser Lys Ile Phe Gly Gly Ser Ile Lys Ser His
                245                 250                 255

Leu Leu Phe Phe Val Ser Arg Glu Gly Gly His Ile Glu Lys Tyr Val
            260                 265                 270

Asp Pro Leu Lys Glu Ile Ala Lys Lys Tyr Arg Asp Asp Ile Leu Phe
        275                 280                 285

Val Thr Ile Ser Ser Asp Glu Glu Asp His Thr Arg Ile Phe Glu Phe
    290                 295                 300

Phe Gly Met Asn Lys Glu Glu Val Pro Thr Ile Arg Leu Ile Lys Leu
305                 310                 315                 320

Glu Glu Asp Met Ala Lys Tyr Lys Pro Glu Ser Asp Asp Leu Ser Ala
                325                 330                 335

Glu Thr Ile Glu Ala Phe Leu Lys Lys Phe Leu Asp Gly Lys Leu Lys
            340                 345                 350

Gln His Leu Leu Ser Gln Glu Leu Pro Glu Asp Trp Asp Lys Asn Pro
        355                 360                 365

Val Lys Val Leu Val Ser Ser Asn Phe Glu Ser Val Ala Leu Asp Lys
    370                 375                 380

Ser Lys Ser Val Leu Val Glu Phe Tyr Ala Pro Trp Cys Gly His Cys
385                 390                 395                 400

Lys Gln Leu Ala Pro Ile Tyr Asp Gln Leu Ala Glu Lys Tyr Lys Asp
                405                 410                 415

Asn Glu Asp Ile Val Ile Ala Lys Met Asp Ser Thr Ala Asn Glu Leu
            420                 425                 430

Glu Ser Ile Lys Ile Ser Ser Phe Pro Thr Ile Lys Tyr Phe Arg Lys
        435                 440                 445

Glu Asp Asn Lys Val Ile Asp Phe Asn Leu Asp Arg Thr Leu Asp Asp
    450                 455                 460

Phe Val Lys Phe Leu Asp Ala Asn Gly Glu Val Ala Asp Ser Glu Pro
465                 470                 475                 480
```

```
Val Glu Glu Thr Glu Glu Glu Glu Glu Ala Pro Lys Lys Asp Glu Leu
                485                 490                 495
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<210> 9
<211> 481
<212> PRT
<213> C. parvum

<400> 9

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Met Ile Gly Ile Arg Ser Leu Val Ser Ala Ala Phe Leu Gly Phe Ser
  1               5                  10                  15

Cys Leu Ser Lys Val Val Leu Gly Gly Asp Glu Ala His Phe Ile Ser
             20                  25                  30

Glu His Ile Thr Ser Leu Thr Ser Ser Asn Phe Glu Asp Phe Ile Lys
         35                  40                  45

Ser Lys Glu His Val Ile Val Thr Phe Phe Ala Pro Trp Cys Gly His
     50                  55                  60

Cys Thr Ala Leu Glu Pro Glu Phe Lys Ala Thr Cys Ala Glu Ile Ser
 65                  70                  75                  80

Lys Leu Ser Pro Pro Val His Cys Gly Ser Val Asp Ala Thr Glu Asn
                 85                  90                  95

Met Glu Leu Ala Gln Gln Tyr Gly Val Ser Gly Tyr Pro Thr Ile Lys
            100                 105                 110

Phe Phe Ser Gly Ile Asp Ser Val Gln Asn Tyr Ser Gly Ala Arg Ser
        115                 120                 125

Lys Asp Ala Phe Ile Lys Tyr Ile Lys Lys Leu Thr Gly Pro Ala Val
    130                 135                 140

Gln Val Ala Glu Ser Glu Glu Ala Ile Lys Thr Ile Phe Ala Ser Ser
145                 150                 155                 160

Ser Ser Ala Phe Val Gly Arg Phe Thr Ser Lys Asp Ser Ala Glu Tyr
                165                 170                 175
```

Ala Val Phe Glu Lys Val Ala Ser Gly His Arg Glu His Asn Tyr Ala
180 185 190

Phe Ile Ala Phe Phe Gln Glu Gly Glu Gln Lys Leu Glu Val Leu His
195 200 205

Lys Asp Glu Glu Pro Val Ser Leu Pro Met Pro Lys Thr Val Glu Glu
210 215 220

Leu Glu Ala Lys Ile Ser Ile Met Asn Val Pro Leu Phe Ser Ala Ile
225 230 235 240

Ser Ala Glu Asn Tyr Ser Leu Tyr Met Ser Arg Glu Gly Tyr Thr Pro
245 250 255

Gly Ser Val Val Leu Thr Arg Thr Ser Pro Ser Met Leu Gln Thr Leu
260 265 270

Glu Arg Leu Gln Leu Ile Thr Glu Lys Ser Met Pro Leu Phe Ser Leu
275 280 285

Asp Thr Glu Gln Phe Gly Ser His Ala Thr Gln His Leu Leu Ile Glu
290 295 300

Lys Phe Pro Gly Leu Val Ile Gln Ser Val Asn Val Pro Ser Ile Arg
305 310 315 320

Tyr Met Tyr Gly Pro Ala Lys Phe Asp Ser Val Glu Pro Leu Lys Glu
325 330 335

Phe Met Lys Gln Val Ser Glu Gly Lys His Glu Leu Ser Ile Lys Ser
340 345 350

Glu Pro Ile Pro Ala Glu Gln Ser Gly Pro Val Thr Val Val Val Gly
355 360 365

Lys Thr Phe Glu Glu Ile Val Phe Arg Ser Asp Lys Asp Val Leu Leu
370 375 380

Glu Ile Tyr Ala Gln Trp Cys Gly His Cys Lys Asn Leu Glu Pro Ile
385 390 395 400

Tyr Asn Gln Leu Gly Glu Glu Tyr Lys Asp Asn Asp Lys Val Val Ile
405 410 415

Ala Lys Ile Asn Gly Pro Gln Asn Asp Ile Pro Tyr Glu Gly Phe Ser

```
            420                 425                 430

Pro Arg Ala Phe Pro Thr Ile Leu Phe Val Lys Ala Gly Thr Arg Thr
        435                 440                 445

Pro Ile Pro Tyr Asp Gly Lys Arg Thr Val Glu Ala Phe Lys Glu Phe
    450                 455                 460

Ile Ser Glu His Ser Ser Phe Pro Gln Glu Lys Glu Ser Arg Asp Glu
465                 470                 475                 480

Leu
```

<210> 10
<211> 508
<212> PRT
<213> Homo sapiens

<400> 10

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Met Leu Arg Arg Ala Leu Leu Cys Leu Ala Val Ala Ala Leu Val Arg
  1               5                  10                  15

Ala Asp Ala Pro Glu Glu Glu Asp His Val Leu Val Leu Arg Lys Ser
             20                  25                  30

Asn Phe Ala Glu Ala Leu Ala Ala His Lys Tyr Leu Leu Val Glu Phe
         35                  40                  45

Tyr Ala Pro Trp Cys Gly His Cys Lys Ala Leu Ala Pro Glu Tyr Ala
     50                  55                  60

Lys Ala Ala Gly Lys Leu Lys Ala Glu Gly Ser Glu Ile Arg Leu Ala
 65                  70                  75                  80

Lys Val Asp Ala Thr Glu Glu Ser Asp Leu Ala Gln Gln Tyr Gly Val
                 85                  90                  95

Arg Gly Tyr Pro Thr Ile Lys Phe Phe Arg Asn Gly Asp Thr Ala Ser
            100                 105                 110

Pro Lys Glu Tyr Thr Ala Gly Arg Glu Ala Asp Asp Ile Val Asn Trp
        115                 120                 125

Leu Lys Lys Arg Thr Gly Pro Ala Ala Thr Thr Leu Pro Asp Gly Ala
```

130 135 140

Ala Ala Glu Ser Leu Val Glu Ser Ser Glu Val Ala Val Ile Gly Phe
145 150 155 160

Phe Lys Asp Val Glu Ser Asp Ser Ala Lys Gln Phe Leu Gln Ala Ala
165 170 175

Glu Ala Ile Asp Asp Ile Pro Phe Gly Ile Thr Ser Asn Ser Asp Val
180 185 190

Phe Ser Lys Tyr Gln Leu Asp Lys Asp Gly Val Val Leu Phe Lys Lys
195 200 205

Phe Asp Glu Gly Arg Asn Asn Phe Glu Gly Glu Val Thr Lys Glu Asn
210 215 220

Leu Leu Asp Phe Ile Lys His Asn Gln Leu Pro Leu Val Ile Glu Phe
225 230 235 240

Thr Glu Gln Thr Ala Pro Lys Ile Phe Gly Gly Glu Ile Lys Thr His
245 250 255

Ile Leu Leu Phe Leu Pro Lys Ser Val Ser Asp Tyr Asp Gly Lys Leu
260 265 270

Ser Asn Phe Lys Thr Ala Ala Glu Ser Phe Lys Gly Lys Ile Leu Phe
275 280 285

Ile Phe Ile Asp Ser Asp His Thr Asp Asn Gln Arg Ile Leu Glu Phe
290 295 300

Phe Gly Leu Lys Lys Glu Glu Cys Pro Ala Val Arg Leu Ile Thr Leu
305 310 315 320

Glu Glu Glu Met Thr Lys Tyr Lys Pro Glu Ser Glu Glu Leu Thr Ala
325 330 335

Glu Arg Ile Thr Glu Phe Cys His Arg Phe Leu Glu Gly Lys Ile Lys
340 345 350

Pro His Leu Met Ser Gln Glu Leu Pro Glu Asp Trp Asp Lys Gln Pro
355 360 365

Val Lys Val Leu Val Gly Lys Asn Phe Glu Asp Val Ala Phe Asp Glu
370 375 380

```
Lys Lys Asn Val Phe Val Glu Phe Tyr Ala Pro Trp Cys Gly His Cys
385                 390                 395                 400

Lys Gln Leu Ala Pro Ile Trp Asp Lys Leu Gly Glu Thr Tyr Lys Asp
                405                 410                 415

His Glu Asn Ile Val Ile Ala Lys Met Asp Ser Thr Ala Asn Glu Val
            420                 425                 430

Glu Ala Val Lys Val His Ser Phe Pro Thr Leu Lys Phe Phe Pro Ala
        435                 440                 445

Ser Ala Asp Arg Thr Val Ile Asp Tyr Asn Gly Glu Arg Thr Leu Asp
    450                 455                 460

Gly Phe Lys Lys Phe Leu Glu Ser Gly Gly Gln Asp Gly Ala Gly Asp
465                 470                 475                 480

Asp Asp Asp Leu Glu Asp Leu Glu Glu Ala Glu Glu Pro Asp Met Glu
                485                 490                 495

Glu Asp Asp Asp Gln Lys Ala Val Lys Asp Glu Leu
            500                 505
```

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